such general cultivation is based on classical studies, the student cannot get the new degree, but must take the Arts degree, which *quoad* natural science must be held to be an inferior degree. But he shows that by the proposed statute the science graduate need know little of natural science, as he may take his degree in the School of Mathematics; thus he shows a degree in natural science might be confined to those who had never got beyond its rudiments; why, then, he asks, does not Canon Liddon propose a new degree in mathematics, and thus "assign one set of students a new decoration which will honourably represent their real attainments." Prof. Odling shows that many of those who in the debate insisted on Greek being necessary to a degree in Arts, admitted it was not necessary to a liberal education; and thus, a degree in Arts must be held as something different from a certificate of liberal education.

"If, then, it be once conceded, and the concession was made without hesitation, that Greek is not essential to a liberal education, and that the studies of mathematics and natural science and modern languages do constitute liberal studies, how is it possible," Prof. Odling asks, "to refuse a degree in Arts to those who, in addition to considerable acquaintance with Latin and German, are possessed of special attainments in either mathematics or natural science, and also of not inconsiderable attainments in the alternative one of these two subjects."

According to the proposed statutes, Prof. Odling concludes, the new natural science degree, while it will certify to an ignorance of Greek, will not certify to a knowledge of natural science.

In reply to Prof. Odling, Canon Liddon asserts that Greek "is an instrument of unrivalled delicacy for effecting the general training of the mental powers, and especially for imparting to them those habits of exactness and refinement without which it is impossible to reach the higher characteristics of an educated man." "An education which excludes Greek," he maintains, "is certainly less liberal than an education which insists on it." For the liberal education of the highest order, only, according to Canon Liddon, to be attained by learning Greek, the highest honour of the University should be reserved; to a lower degree of liberality attained through means of natural science, even with a training in Latin or German, an inferior honour can only be conceded.

At present we give these arguments and assertions without comment.

## *NOTES*

AN influential committee has been recently formed for the purpose of obtaining subscriptions to procure a portrait of Dr. W. B. Carpenter, F.R.S., to be presented to the University of London as a permanent memorial of his long and assiduous labours on behalf of that institution. We need not say one word to commend the object of the "Carpenter Memorial Committee" to the practical consideration of our readers; Dr. Carpenter's services to science and to the London University are so well known, that we are confident the proposal of the Committee will meet with a satisfactory response. Earl Granville is chairman of the Committee, which contains many names eminent in science, as well as in other departments. The honorary treasurers are Sir John Lubbock and Dr. William Smith, to either of whom cheques and post-office orders should be made payable. Subscriptions should be sent to either of the honorary secretaries, J. G. Fitch, 5, Lancaster Terrace, Regent's Park, or G. Knight Watson, Society of Antiquaries, Burlington House.

WE take the following from the *Gardeners' Chronicle*:—"The *London Gazette* of the 24th inst. announces that Her Majesty has been graciously pleased to confer the appointment of Companion of the Most Distinguished Order of St. Michael and St. George on George Bentham, Esq. While we rejoice to find some official recognition made of the life-long services to botany rendered by Mr. Bentham, we regret that such recognition has been so tardy, and that it is so inadequate. Such distinctions are not as a rule highly prized by scientific men, inasmuch as they are not specially appropriate to them; but if paid at all, they should be prompt and adequate." Baron von Müller, Government Botanist of Victoria, has been promoted to the dignity of Knight Commander of the same order, and a well-deserved knighthood has been bestowed on Mr. Henry Bessemer.

WE regret to record the death at Halifax, Nova Scotia, of Prof. John James Mackenzie, at the age of thirty-two. After graduating from Dalhousie University, and passing several years as a teacher of mathematics and physics, he went in 1873 to Germany, where he underwent a thorough course of physical training at Leipzig. Here he received, in 1876, the doctor's degree, presenting an able dissertation on the absorption of gases by saline solutions, based on a most exhaustive and extensive series of experiments. The following year was passed in research in Helmholtz's laboratory at Berlin, where Dr. Mackenzie, among other results, succeeded in showing that in the relations hitherto supposed to exist between light and electricity, the optical phenomena observed were not due to electric tension itself, but probably in a secondary manner to the heat evolved. In 1877 he accepted a call to the Chair of Physics at Dalhousie University, Nova Scotia. At the commencement of a scientific career from which much was expected by his numerous friends, he was suddenly taken away by an insidious complaint induced a year since by the inhalation of the nitrous fumes from a Bunsen battery.

M. GYLDÉN has been elected a Corresponding Member in the Astronomical Section of the Paris Academy in place of the late Father Secchi.

WE notice the appearance in May of the German *Jahresberichte über die Fortschritte der Chemie* for 1877. The present volume forms the thirtieth of the series founded by Liebig and Kopp, and is at present under the editorial supervision of Prof. Fittica of Marburg, assisted by a corps of eleven German and Austrian chemists. It is by far the most important and the most extensive of all annual reviews, and affords to even a superficial observer an interesting glimpse into the variety and extent of the chemical discovery of our day. Of its 1,400 pages, 196 are devoted to theoretical and physical chemistry, 120 to inorganic chemistry, 714 to organic chemistry, 66 to analytical chemistry, 152 to technical chemistry, 104 to mineralogy, and 46 to chemical geology. Of the space devoted to organic chemistry—more than one-half of the work—364 pages are occupied with the chemistry of the aromatic series, 48 with animal chemistry, 47 with vegetable chemistry, &c. The index of authors contains over 1,750 names, and in comparison with the indices for 1867 (850 authors) and 1857 (720 authors) shows the rapid increase of late years in the number of those devoted to chemical research. Nine volumes of the *Jahresbericht* are now out of print, and complete sets are quoted at 800 marks. Individual volumes bring as high as 100 marks. German booksellers state that this rarity is occasioned in a notable degree by recent extensive purchases for public and private libraries in the United States.

DURING the past week Etna has been in active and increasing eruption. A very considerable number of new craters have opened, and that on both flanks of the mountain. The lava has reached many miles from the mountain, almost to the River Alcantara, laying waste the surrounding country. The village of Mojo has been destroyed, and others are threatened.

A volcanic eruption which has broken out in a mountain on the banks of Lake Balaton in Hungary, seems to have begun almost simultaneously with that of Etna, referred to in next note.

The following are the most recent reports of earthquakes from various quarters:—From April 25 until May 2 repeated violent shocks were felt in the Senio valley in the Romagna. Several buildings were destroyed completely and many others damaged. The village of Palazzuolo suffered most, and the inhabitants left the dwellings and camped out in the fields.—Another series of shocks occurred at Shabka, in the Soroki district, Bessarabia; they were preceded by a subterranean noise similar to the report of a cannon, followed by a long rumbling noise. Twenty-four houses fell in; fissures appeared in the soil, from which water flowed out. Fifty-four trees were uprooted.—A third and fourth phenomenon of this nature were observed at Serajewo (Bosnia) on May 14 in the morning, and at Maramaros-Szigeth (Hungary) on May 18 at midnight. Altogether the volcanic phenomena in the Austrian Empire have been remarkable recently, and the signs of eruption shown by the Csobancz, one of the mountain cones on the shores of Lake Balaton, which has been extinct for centuries are no less so.—The last report which has reached us comes from Batavia, where, on April 4, a violent earthquake was observed. At Tjandjoer, some fifty miles from Batavia, a number of stone houses fell, burying many of the inhabitants beneath their ruins.—A Samarang paper states that the volcanoes in Eastern and Western Java are simultaneously in eruption. From the Smeru volcano a broad fiery stream of lava is making its way through a ravine to the seashore on the south, while at the other end of Java the Gedeh mountain is casting out an immense quantity of ashes, which spread themselves for miles round the neighbourhood.

An exceptionally large meteor was observed at Herford (Westphalia) on April 25 at 8.30 P.M. The nucleus was nearly of the apparent size of the moon's disk, and its light was so brilliant that while the phenomenon lasted (*i.e.*, three seconds) no fixed stars could be seen.

The Italian State Secretary for Public Buildings has sanctioned the plans submitted to him for the construction of an observatory on the summit of Mount Etna.

The Anthropological Exhibition at Moscow seems to be one of great interest. It is contained in a vast building lent by the Minister of War, and used in winter for drilling soldiers, and the exhibition has been rendered as picturesque as it is scientific. A garden which has been arranged most artistically for the purpose presents, among other features, a very remarkable "palæontological valley." This is planted with lycopods, gigantic ferns, and other fossil plants; this forest is inhabited by models representing megatheriums, mammoths, ichthyosaurs, &c. On miniature mountains, the age of which is indicated by artificial geological sections, are shown *fac-similes* of Russian, French, Danish, and other tumuli. Besides this, an ethnological garden is peopled with models representing the principal human types, especially those of Russia. There is, besides, a remarkable anatomical and craniological exhibition. Altogether this is one of the most remarkable anthropological exhibitions ever brought together, and has been an immense success.

The question of the definite location of the observatory for which a legacy of 700,000 dollars was provided by the late James Lick, has resolved itself into a selection of one of the three peaks of Mount Hamilton—Observatory Peak, 4,302 feet high; East Peak, 4,448 feet; and Middle Peak, 4,318 feet. At the suggestion, it is said, of Prof. Simon Newcomb, of the U.S. Naval Observatory, to whom the question was submitted, the trustees have referred the subject of a selection to Mr. S. W. Burnham, an amateur astronomer of some distinction. So soon as this decision is announced, the work of erection will be at once proceeded with.

A few weeks ago the fossil head of a *Rhinocerus tichorhinus* was found in Siberia, and is said to be in a very good state of preservation. The valuable object was presented to the Museum of Moscow University by the Siberian branch of the Russian Geographical Society, and will find a place in the Anthropological Exhibition at Moscow.

A new sensation is in store for visitors to Niagara; whether desirable or otherwise will depend on the tastes of the visitors. The "Niagara Falls Prospect Park Company" have ordered one of the largest-sized Brush machines and sixteen lamps, wherewith, by means of parabolic reflectors and otherwise, to throw light upon the descending water and upon the mist, "thus producing electric rainbows to order in the darkest night." It is also expected that a light can be placed behind the American fall, so as to throw rays out through the water.

The death is announced of Karl Koch, formerly Professor of Botany in Berlin University.

We hear that the Abbé Moigno, the editor of *Les Mondes*, who has just published a work in three volumes called "Les Splendeurs de la Foi," has disposed of his journal, and will proceed to Rome in order to lay before his Holiness the *comble* of his science. He may eventually be rewarded by being made a cardinal.

A venerable relic of past engineering skill has been presented by the Earl of Lonsdale to the Patent Office Museum, South Kensington, where it may be seen by the public. This is a specimen of Heslop's Winding and Pumping Engine, a patent for which, numbered 1,760, was taken out in the year 1790. Heslop's engine, one of the immediate predecessors of James Watts's invention, was considered in the days of our great grandfathers to be an almost perfect machine, being superior to the atmospheric engine of Newcomen, even as improved by Smeaton. The present engine has been at work in the neighbourhood of Whitehaven for seventy-three years, having been erected at Kell's Pit for raising coal about 1795, afterwards removed to Castlerigg Pit, and thence to Wreath Pit in 1837. At the latter place it not only lifted coal out of the mine but worked a pump till last summer, when it was brought to London. The engine now at South Kensington is the last survivor of its race.

A telegram from New York, June 1, states that the States of Kansas and Nebraska have been visited by a tornado, by which about forty persons were killed and over one hundred wounded, while fifty buildings were destroyed, and the crops and other property greatly damaged.

Mr. W. H. Coffin writes us with reference to our note last week on the *conversazione* of the Institution of Civil Engineers. He states that the electric lamp for surgical use exhibited by him is an improved modification of M. Trouvé's "Polyscope Electrique," devised and constructed by Messrs. Coxeter and Son, the surgical instrument makers.

The Municipal Council of Paris has resolved to adopt the cremation system on sanitary grounds.

Among various applications proposed by M. Planté for his secondary couples is that of electrical drilling. It is known that those high-tension currents (which he produces), when made to act on glass in presence of a saline solution, act like a graver or diamond, tracing grooves and making considerable hollows. Rock crystal may be thus attacked, spite of its hardness, and if it is not regularly engraved, it at least breaks into small fragments, and is ultimately disaggregated. Now, in America, black diamonds are used to attack hard rocks and effect the borings for mines. Might not these (M. Planté asks) be advantageously replaced by action of the electric current in the way indicated? (The diamonds are very expensive and are gradually lost by being detached from the pieces to which they are fixed.) Platina electrodes would not be necessary, for it is not here the metal of the electrode that is altered, but the silicious matter, in presence of the saline solution. Metallic points or rods distributed suitably at the end of the drill-stem, insulated in part of their length and animated by rotatory motion, would bring the electric current to the surface of the rock to be pulverised. The progress recently realised in the production of electricity by mechanical means might facilitate this application.

IF perpetual motion be defined as that of a body which, after having received an impulse, continues to move indefinitely in virtue of its inertia alone, it is, M. Plateau considers, realisable. He introduces a foreign force of constant nature to destroy resistance, instead of (as in the case of a pendulum) restoring motion which resistance has withdrawn. Thus, conceive a horizontal disk movable round a vertical axis fixed to the centre of its under surface. A small hemispherical cavity is made on the upper face. A motor force of rapid rotation is got from a reservoir below the lowest water of a river, giving a uniform intense flow by a lower orifice. Before letting the water act on the disk, a top, previously set in very quick rotation, is deposited with its point in the middle of the hemispherical cavity; then the top is covered with a glass bell jar, which is fixed with its axis coinciding with that of the apparatus. The disk with the bell jar is then set rotating by means of the water in the same direction as the top. After a certain time (it may be supposed) the movements of disk, top, and inclosed air will be equalised; then the top will no longer experience resistance at its point, for the support turns as quickly as it and in the same direction; nor will it, from surrounding air, for this also has the same angular velocity. Thus we should have the curious spectacle of a top remaining indefinitely in equilibrium on its point, presenting a case of perpetual motion in the sense defined. Of course the water would have to be let off after action on the apparatus, also the surplus water of the reservoir.

WE have received from Messrs. Dent and Co. an interesting summary of the principal works executed by that house since its foundation in 1814. The last noted is the commencement in 1879 of the great galvanic chronographic apparatus of the Imperial Observatory of Japan.

Two other volumes of the "Natural History Rambles" series have been sent us by the S.P.C.K.—"Mountain and Moor," by Dr. J. E. Taylor; and "Lakes and Rivers," by Mr. Groom Napier.

THE Asiatic Society of Japan are showing considerable activity in the issue of their publications, for another number of their *Transactions* has lately come to hand. This opens with some curious notes on the analysis of bamboo-shoots, which are much used as an article of food in Japan. Dr. Dwars arrives at the conclusion that the shoots examined at that period of their development must be considered a nourishing vegetable, and that they may even rival the cauliflower and asparagus. Mr. Satow supplies the first of a series of papers on ancient Japanese rituals, as well as some instructive notes on the vicissitudes of the Church at Yamaguchi from A.D. 1550 to 1586.

A NOTABLE change has taken place in the Jardin des Plantes of Paris, and should be noticed by foreigners. All the galleries and houses are open every day from one to four without any ticket of admittance being required from visitors. The plant-houses only are closed on Sunday.

A MUNICIPAL SCHOOL has been recently established in Paris for apprenticeship in the work of wood and iron.

A PART of the buildings of the Universal Exhibition has been purchased by the French War Office for the use of the aëronautical school at Meudon. It will be utilised for building and inflating balloons.

THE large Giffard Captive Balloon is ready for inflation, and the gas will be passed into it as soon as the state of the weather will permit the operation to begin.

THE additions to the Zoological Society's Gardens during the past week include a White-thighed Colobus (*Colobus bicolor*) from West Africa, presented by Dr. H. Hart; two Silky Marmosets (*Midas rosalia*) from South-East Brazil, presented by Mrs. Hector; a Capybara (*Hydrochœrus capybara*) from South America, presented by Mr. H. B. Whitmarsh; a Puff Adder (*Vipera arietans*) from West Africa, presented by Surgeon F. Speer; a Brown Hyæna (*Hyæna brunnea*) from South Africa, an Argus Pheasant (*Argus giganteus*) from Malacca, purchased; a Michie's Tufted Deer (*Elaphodus cephalophus*) from China, deposited; an Axis Deer (*Cervus axis*), born in the Gardens.

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## *PREHISTORIC INVESTIGATIONS IN AUSTRIA*[1]

I. *Lower Austria.*—At Mount Calvary, near Pellichsdorf, on the Marchfeld, a plain east of Vienna, explorations conducted by F. Heger, from June 26th, to July 28th, 1878. A great number of urns, pateræ, &c., of peculiar forms, not known from any other locality. Although broken by pressure, thirteen were more or less susceptible of reconstruction. Most of them were found in a space inclosed with strong beams of wood. A broken bronze armlet was also met with.

II. *Carniola.*—Explorations conducted by von Hochstetter and Ch. Deschmann, Superintendent of the Provincial Museum of Laibach.

1. Terszisce, near Zirknitz, July 16th, 1878, Prehistoric Fortified Station, and burial-ground, with human bones, more or less burnt, and many objects of bronze and iron, like those of the Celtic burial-ground of Hallstadt in Upper Austria.

2. Grad, near St. Michael, not far from Adelsberg, July 23rd, 1878. Separate skeletons, bronze objects, and Pre-Roman coins.

3. Slemschek, near Waatsch and Littai. Prehistoric Station of the "Hallstadt Period," with extensive burial-place. The graves are flat: some contain skeletons; others burnt remains. The latter are covered with heavy stone slabs, and contain large urns, of various forms, which have burnt bones within or underneath. Many objects, both ordinary and ornamental, of bronze, iron, amber, glass, bone, &c., were found, including a bronze helmet in excellent preservation. From July to October, 1878, about 200 graves were examined, mostly at the cost of the Provincial Museum of Carniola.

4. Dolle, near Gora and Waatsch. Separate graves, of the same character as those at Slemschek.

5. Vier, between Sittich and St. Veit, Lower Carniola. Above the village is a perfect ring-shaped earth-work; below it, on both sides of the high road a number of tumuli. Nearer St. Veit are flat graves, covered with slabs. This was probably the place of the *Acervone* of the Pentigerian Tables, or the Roman *ad Acervos*, which name, according to Prof. Müllner, is derived from these Pre-Roman tumuli.

6. Moratzch, near Heiligenkreuz. Flat graves and tumuli, August 1st, two skeletons were dug out, a male and a female, with earthen vases, iron knives, and a bone comb. These burials are probably later than those of Nos. 1-5.

7. Mariathal, south-east of Littai. Ancient castle surrounded with a rampart; also flat graves and tumuli containing skeletons August 2nd and 3rd, a male skeleton without arms, and with violently fractured skull was exhumed, together with many objects, including an elegantly ornamented urn, similar to those found at Slemschek.

8. Ober-Strascha, on the left bank of the river Gurk, above Rudolfsworth. Old ring-rampart and a few scattered tumuli.

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[1] "Prehistorical Investigations in Lower Austria, Carniola, and Bohemia." By F. von Hochstetter, President of the Prehistorical Commission of the Imperial Academy, Vienna. (Imperial Academy of Sciences, Vienna, Meeting, January 16, 1879.)